

SEVERE LOCAL STORMS.

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau.]

Place.	Date.	Time.	Width of path (yards).	Loss of life.	Value of property destroyed.	Character of storm.	Remarks.	Authority.
Chicago, Ill., and Great Lakes region.	5-6					Wind.....	Lake traffic tied up. Three vessels reported missing, others forced to seek shelter. Heavy damage at Sault Ste. Marie.	Times (Washington, D. C.); Star (Oneonta, N. Y.).
Jefferson, Tex.....	7	5-7 a. m.			\$5,000	Electrical and rain, followed by small tornado.	Wind damaged roof of post office and unroofed several buildings.	Times Herald (Dallas, Tex.).
Lake Oneida, N. Y.....	5				150,000	High winds.....	5 barges and some 50,000 bushels of wheat destroyed.	Official, U. S. Weather Bureau.
Lizard Island (75 miles north of Point Aux Pins, Ont.).	13			27?		do.....	Tug Reliance wrecked on rocks. 27 persons reported missing. Survivors exposed to severe cold.	Post; Herald (Washington, D. C.).
Tullahoma, Tenn.....	14-15					Thunderstorm....	A number of houses were blown from foundations and 2 barns destroyed. Loss estimated at thousands.	Official, U. S. Weather Bureau.
Port Arthur, Tex.....	26	7:25 p. m.	30-50		10,000	Small tornado.....	One child injured; several small buildings destroyed and others unroofed. Considerable damage to telephone, electric wires, and poles.	Do.
Reno, Nev., and vicinity.....	27					High wind.....	Telephone poles were blown down and haystacks damaged in a few localities.	Do.
Hinds, Grenada, and Lee Counties, Miss.	27	12-1 a. m.		5	100,000	Probably tornadoes.	Several houses destroyed; poles and wires down. Heavy property damage in Grenada.	Official, U. S. Weather Bureau; Commercial Appeal (Memphis, Tenn.).
New York State and north Atlantic seaboard.	27, 28, 29			1		Rain, snow, wind, and sleet.	Hundreds of persons injured; buildings and signs damaged; transportation paralyzed. Several boats wrecked, the crews of 3 of which are missing.	Press (Binghamton, N. Y.); Star Gazette (Elmira, N. Y.); World; Times (New York).
Northeastern Ohio.....	27-28				350,000	Sleet, snow, and wind.	8 persons injured, traffic interrupted, trains delayed, and many trees and poles down. Greatest loss to the Ohio Telephone Co.	Official, U. S. Weather Bureau; Journal of Commerce (New York).
Southern New England coast.	28					do.....	Communication cut off at Block Island. No other damage reported.	Do.
Newport, Oreg.....	30					High winds.....	Boat traffic tied up.....	Oregonian (Portland, Oreg.).

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

Although very stormy weather prevailed much of the month along the steamer lanes between North America and Europe, the intense cyclonic areas charted over the north Atlantic Ocean did not become severe storms until after they had passed eastward from the New England coast, except on the 28th-29th, when a storm of exceptional severity prevailed along the coast north of Delaware Breakwater. Several stations reported maximum wind velocities of 60 miles an hour or more from the northeast, attended by thick weather with rain or snow, the highest velocity, 72 miles an hour occurring at Block Island, R. I., during the afternoon of the 28th. This storm developed during the 24th-25th over the central Rocky Mountain and Plateau regions, whence it moved slowly eastward with increasing intensity and was central over Arkansas on the morning of the 27th.

At this time a strong anticyclone was advancing eastward over Ontario and Quebec and a marked increase in pressure was in progress over New England and the Canadian Maritime Provinces. This distribution of pressure is always attended by stormy weather along the north Atlantic coast within 24 to 36 hours; therefore in the regular morning forecasts of the 27th was included the statement that there was a possibility of dangerous gales the following day along the coast from New Jersey northward. Northeast storm warnings were ordered displayed at 6 p. m. from Delaware Breakwater to Eastport, Me., and at 9:30 p. m. southeast warnings were displayed south of Delaware Breakwater to Cape Hatteras. The following morning the storm was central over Virginia and West Virginia with a strong pressure gradient to the northeastward and whole-gale warnings were ordered displayed at 9:30 a. m. from Block Island, R. I., to Provincetown, Mass. The storm center passed some distance south of Nantucket, Mass. (moving east-northeastward), the morning of the 29th, and all warn-

ings were lowered by the morning of the 30th. Heavy snow fell over portions of New England and New York during the 28th-29th.

Storm warnings were displayed along portions of the middle Atlantic and north Atlantic coasts on a number of dates earlier in the month in connection with disturbances that moved eastward over the Lake region and the upper Ohio Valley, but no winds of 50 miles an hour, or over, were reported, except 52 miles from the northwest at New York, N. Y., on the 5th and 66 miles from the northwest at Block Island, R. I. on the 6th.

Cold-wave warnings were issued for portions of the Washington Forecast District on the 5th, 11th, 12th, 14th, 17th, and 18th, and these warnings, except that of the 14th, were verified over most of the areas for which they were issued.

Frost warnings were issued for portions of the South Atlantic or the East Gulf States on the following dates: 9th, 10th, 17th, 19th, 22d, 23d, 28th, 29th, and 31st; however, none were issued for southern Florida.—*Charles L. Mitchell.*

CHICAGO FORECAST DISTRICT.

Storm warnings.—The severe storm that reached the Lake region on the closing day of November moved rapidly eastward on December 1, and by night the center was over the mouth of the St. Lawrence River. At 3 p. m. of the 1st, northwest warnings were issued for the central and eastern portions of Lake Superior, but these, as well as the warnings that were continued on Lake Ontario on the night of the 1st, were lowered on the following morning. In both cases, however, the warnings were justified.

On the morning of the 4th a disturbance that developed two days previously over the State of Washington was central over northwestern Missouri, with increasing energy. Accordingly, southeast warnings were issued for southwestern Lake Michigan, except Chicago, and northeast warnings for the northwestern portion of the

Lake, and for Lake Superior from Duluth to Houghton. Later in the morning northeast warnings were extended over the remainder of Lake Superior and were also issued for Lake Huron and northeastern Lake Michigan, and for Chicago. Special observations at 2 p. m. indicated that the disturbance was moving more to the northward than at first expected; therefore, at 3:30 p. m., the northeast warnings on Lake Huron were changed to southeast, and at the same time southeast warnings were issued for Lake Erie; later, at 9:30 p. m., southeast warnings were extended over Lake Ontario. Verifying velocities from the directions indicated were confined to northern Lake Huron, but as the storm passed to the eastward practically all stations experienced verifying velocities from a westerly direction. Whitefish Point, Mich., reported a maximum velocity of 68 miles an hour, and Middle Island, one of 64 miles an hour. At 9 a. m. of the 5th the warnings were changed to northwest from Houghton east on Lake Superior, and also on northern Michigan, eastern Erie, Huron, and Ontario. Action had been taken one hour previously, however, by the officials at Alpena, Mich., and Buffalo, N. Y., to effect this change. Owing to the persistence of winds of gale force at Oswego, N. Y., on the morning of the 6th the warnings were continued over extreme eastern Ontario until 4 p. m. of that date.

Southeast warnings were issued on the night of the 6th for the west shore of Lake Michigan from Chicago to Sheboygan in anticipation of the development of a disturbance of wide extent then over the West, but the warning was lowered on the following morning when it had become apparent that winds of storm strength probably would not occur. However, as this disturbance reached the upper Lakes it increased in energy, and on the morning of the 8th northwest warnings were ordered for Lake Superior from Houghton eastward, and for Lake Huron and the eastern shore of Lake Michigan; while southwest warnings were displayed on Lake Ontario and on Lake Erie from Erie eastward. In most cases these warnings were verified. By 8 p. m. of the 8th the storm had spent its force on the Lakes and therefore all warnings were lowered.

On the evening of the 10th a disturbance of considerable geographic extent occupied the northern Rocky Mountain and Northern Plains States, while a high-pressure area of great magnitude covered the East. At that time northeast warnings were ordered for the Duluth and Ashland sections of Lake Superior, and southeast warnings for the remainder of that lake. On the following morning the disturbance extended from the upper Mississippi Valley southwestward to Colorado. An area of high pressure and low temperature appeared to the northwestward. Accordingly, the warnings on Lake Superior were changed to northwest and at the same time southwest warnings were issued for Lakes Michigan, Huron, Erie, and Ontario. As the result of special observations in the afternoon the warnings were changed to northwest on Lakes Michigan and Huron, and on Lake Superior from Marquette eastward, and on the following morning they were changed to northwest over eastern Lake Erie. All these warnings were fully verified, the storm being severe over certain portions of the lakes. At Buffalo, N. Y., a maximum velocity of 72 miles an hour was experienced; on Lake Superior the tug *Reliance* grounded on the rocky shores of Lizard Island and was reported to have been wrecked.

The final storm warnings for the season were issued on the night of the 19th and the morning of the 20th in

connection with a disturbance of moderate strength that was centered over the Red River at 8 p. m. of the 19th. Northwest warnings were issued at 10 p. m. for Lake Superior from Duluth to Houghton, and on the following morning these were extended over the remainder of the upper Lakes, except the west shore of Lake Michigan south of the Escanaba section. At the same time southwest warnings were displayed on the lower Lakes. The warnings were verified over extreme western Lake Superior and on the eastern shore of Lake Michigan, while elsewhere winds of near storm force occurred.

The only small-craft warning issued was that on the morning of the 7th by the Houghton official.

The storm-warning season closed on the 20th, and thereafter only one advisory warning was issued for Lake Michigan—that on the night of the 29th in connection with a disturbance that was advancing from the Plains States.

Cold-wave warnings.—Cold-wave warnings were issued for some portion of the district on eight different dates, but on only one date, namely the 11th, were warnings disseminated over a large portion of the district. On that date cold-wave warnings were issued for portions of the upper Mississippi and lower Missouri Valleys and Middle Plains States, and in the early afternoon the warnings were extended to the eastern and southern limits of the district. The fall in temperature occurred as expected, and on the morning of the 12th the line of zero temperature reached southward into southeastern Iowa.

Cold-wave warnings were also issued on the morning of the 14th for portions of the Plains States and in the afternoon the warnings were extended to include eastern Nebraska, western Iowa, and Missouri. These warnings were not fully verified, but nevertheless a marked fall in temperature occurred throughout the area for which the warnings had been issued.

Cold-wave conditions again developed on the morning of the 16th, when warnings were issued for southern and eastern Montana and for Wyoming, and in the afternoon for central Iowa. On the following morning lower Michigan, Indiana, and southern and eastern Illinois were included. All these warnings were verified, the temperature falling below zero on the morning of the 18th as far south as central Indiana.

A limited cold-wave warning was issued on the morning of the 19th for the extreme upper Missouri Valley, and the warning was verified in part.

The last cold-wave warning for the month was issued on the morning of the 20th and included in its scope upper Michigan and northern lower Michigan. This warning failed of verification owing to the rapid approach of an area of low pressure from the Northwest.

Stock warnings were issued during the month as follows: 6th and 11th, southeastern Wyoming; 13th, Wyoming, western South Dakota, and southern Montana; 14th, Kansas, Missouri, and Nebraska; 16th, Wyoming, Nebraska, and Kansas; 19th, North Dakota.—C. A. Donnel.

NEW ORLEANS FORECAST DISTRICT.

The movement of the areas of high pressure during this month was more eastward than southward and it is due largely to this fact that true cold waves occurred only in the northwestern portion of the district, although cold waves appeared at times to threaten the eastern and southern portions, also. The prevailing character of